



JUL 21 8 53 AM '99

July 19, 1999

Mr. Gerold Noyes
Vermont ANR/DEC
Waste Management Division
103 South Main St. /West Building
Waterbury, VT 05671-0404

RE: Investigation of Subsurface Petroleum Contamination at Abrams Sunoco, Essex
Junction, VT (VT DEC Site #98-2553)

Dear Mr. Noyes:

Enclosed please find the summary report for a site investigation conducted at the above referenced site. This report has been forwarded to the Vermont Department of Environmental Conservation (VTDEC) on behalf of J. W. Sandri of Vermont, Inc. at the request of Ms. Sharon Abbott.

Please contact me if you have any questions or comments regarding this report.

Sincerely,

Beth Stopford
Environmental Engineer

Enclosure

cc: GI#39941498

**INITIAL INVESTIGATION OF
SUBSURFACE PETROLEUM CONTAMINATION AT
ABRAMS SUNOCO**

JULY 15, 1999

Site Location:

**Abrams Sunoco
142 Pearl Street
Essex Junction, VT**

**VTDEC SITE #98-2553
GI Project # 39941498**

Prepared For:

**Mr. Edward W. Bitzer
J. W. Sandri of VT, Inc.
P.O. Box 1578
Greenfield, MA 01302**

Prepared By:



P.O. Box 943 / 20 Commerce Street Williston, VT 05495 (802) 865-4288

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I. INTRODUCTION

This report summarizes the initial investigation of suspected subsurface petroleum contamination at the Abrams Sunoco located on Pearl Street in Essex Junction, VT (see location map in Appendix A). This investigation was conducted by Griffin International, Inc. (Griffin) for J. W. Sandri of VT, Inc. (Sandri) to address petroleum contamination detected during an underground storage tank (UST) closure inspection in December 1998. The Vermont Department of Environmental Conservation (VTDEC) requested that this work be completed in a letter to Mr. Edward Bitzer of Sandri, from Mr. Chuck Schwer of the VTDEC, dated February 22, 1998. The site, (VTDEC Site #98-2553), is owned by Sandri of Greenfield, MA.

Work conducted at the site included the installation of four groundwater monitoring wells, the collection and laboratory analysis of groundwater samples from these monitoring wells, and soil stockpile monitoring. In addition, a sensitive receptor risk assessment was conducted to assess the risk that subsurface petroleum contamination at the site may pose to potentially sensitive receptors identified in the site vicinity. Work has been conducted in accordance with Griffin's *Work Plan and Cost Estimate for Subsurface Investigation and Soil Stockpile Monitoring at Abrams Sunoco* dated March 15, 1999. The Work Plan was approved by Ms. Sharon Abbott of Sandri, in a telephone conversation with Griffin on March 19, 1999, and by Mr. Gerold Noyes of the VTDEC in a letter dated April 5, 1999.

II. SITE BACKGROUND

A. Site History

Subsurface petroleum contamination was detected in soil at the Abrams Sunoco site during the closure of (3) 4,000-gallon gasoline and (1) 4,000-gallon diesel USTs. These tanks were replaced with (1) 8,000-gallon gasoline and (1) 10,000-gallon gasoline USTs. During excavation an abandoned 500-gallon No. 2 fuel oil UST was discovered in the excavation and removed. Tank closure activities were conducted on December 14, 1998. Details of the closure inspection are outlined in the Underground Storage Tank Permanent Closure Form, which was submitted to the VTDEC by Sandri [1]. Adsorbed petroleum contamination was detected in the vicinity of the former USTs, as measured with a photoionization detector (PID). Concentrations of volatile organic compounds (VOCs) measured with the PID in the vicinity of the gasoline and diesel UST system exceeded Soil Guideline Thresholds set by the Waste Management Division of the VTDEC (as per *Agency Guidelines for Contaminated Soils and Debris* [August, 1996]).

In compliance with a request from the VTDEC that additional work be conducted at this site in order to determine the degree and extent of petroleum contamination, Sandri retained the services of Griffin to conduct this initial site investigation.

B. Site Description

Abrams Sunoco is located on the southwest side of Pearl Street in Essex Junction, VT (see Site Location Map in Appendix A). The area surrounding the site is primarily commercial. Retail stores, restaurants and professional offices are located on Pearl Street in the vicinity of the site. The property to the south and southeast is owned by the Canadian National Railroad, and consists of unimproved land.

The entire area, including the Abrams Sunoco, is serviced by municipal water and sewer systems. According to the Essex Junction Public Works Department [2], there are no private water supply wells in use in the area.

The on-site Sunoco garage is constructed on a cement slab foundation. The majority of the property surrounding the building is paved. Some landscaped areas and lawn exist at the perimeter of the property and on an island between the building and Pearl Street (see Site Map).

C. Site Geologic Setting

According to the Surficial Geologic Map of Vermont [3], the site is underlain by pebbly marine sand. Actual subsurface materials consist of poorly graded fine sand. Bedrock at the site is mapped as Clarendon Springs, Ticonderoga, and Rock River dolomites [4]. These formations consist of fairly uniform, massive, smooth, weathered, gray dolomite.

Based on visual observation and review of USGS topographic maps [5, 6, 7, 8], groundwater in the vicinity of the Abrams Sunoco site would be expected to flow to the northwest toward Sunderland Brook or to the west toward the Winooski River, following topographic contours.

III. INVESTIGATIVE PROCEDURES

A. Monitoring Well Installation

On April 21 and 22, 1999, four monitoring wells were installed by T&K Drilling of Troy, New Hampshire using a hollow stem auger drilling rig. Drilling and well construction were directly supervised by a Griffin hydrogeologist. Soil samples were collected at five-foot intervals from each boring. Each soil sample was screened for volatile organic compounds (VOCs) using an HNu™ Model PI-101 PID equipped with a 10.2 eV bulb. Soils were screened using the Griffin Jar/Polyethylene Bag Headspace Screening Protocol, which conforms to state and industry standards. Contaminant concentrations and soil characteristics were recorded in detailed boring logs by the supervising Griffin hydrogeologist (see the Well Logs in Appendix B).

The monitoring wells (MW-1, MW-2, MW-3, and MW-4) were installed to help better define groundwater flow direction and gradient and the degree and extent of suspected petroleum contamination at the site. MW-1 was installed northeast of the presumed source area (e.g. the former gasoline and diesel UST system) in a presumed upgradient direction. MW-2 was installed north of the presumed source area, in an estimated down or crossgradient direction. MW-3 was installed west of the former UST system, in an estimated down or crossgradient direction. MW-4 is located in the vicinity of the former UST system.

The monitoring wells were constructed of 2-inch diameter Schedule 40 PVC riser and 0.010-inch factory slotted, well screen. The length of the riser and the screened section of pipe varied depending on the depth of the well. The annulus between the well screen and the borehole was filled with a sand pack to just above the well screen. A bentonite seal was placed above the sand pack. Approximately 4.5 feet of native backfill was added to the boring, and a second bentonite seal was placed above the native material. The remainder of the boring was filled with native backfill. To complete the construction of each well, a road box was set in concrete at grade level. In addition, locking well caps were placed on the monitoring wells. Specific well construction details are displayed in the detailed well logs included in Appendix B.

MW1

The boring for MW1 was advanced to 22 feet below grade. Soils from the boring from MW1 consisted of dry poorly graded sand from 1 to 2 feet below grade. Dry, poorly graded sand was observed between 5 and 7 feet below grade and from 10 to 12 feet below grade. Wet, poorly graded sand was observed between 15 and 17 feet below grade and from 20 to 22 feet below grade. Soil samples collected for PID screening had a maximum reading of 0.6 ppm, measured in the samples collected between 5 to 7, 10 to 12, and 20 to 22 feet.

Groundwater was encountered at approximately 14 feet below grade. The screened section of the well was installed to 20 feet below the ground surface, at the point where refusal was met.

MW-2

The boring for MW2 was advanced to 22 feet below grade. Soils from the boring consisted of dry poorly graded sand from 1 to 2 feet below grade. Poorly graded sand was observed between 5 and 7 feet, between 10 and 12 feet, between 13 and 17 feet, and between 20 and 22 feet below grade. Low VOC levels were detected using the PID. The maximum reading was 7.8 ppm at 15 to 17 feet below grade.

Groundwater was encountered at 14 feet below grade. The screened section of the well was installed to 20 feet below grade.

MW-3

The boring for MW-3 was advanced to 22 feet below grade. Soils from the boring consisted of dry poorly graded sand from 1 to 2 feet below grade. Poorly graded sand was observed between 5 and 7 feet, between 10 and 12 feet, between 15 and 17 feet, and between 20 and 22 feet below grade. Low VOC levels were detected using the PID, a maximum reading of 1.2 ppm was measured between 1 and 2 feet below grade.

Groundwater was encountered at 14 feet below grade. The screened section of the well was installed to 20 feet below grade.

MW-4

The boring for MW-4 was advanced to 22 feet below grade. Soils from the boring consisted of dry poorly graded sand from 1 to 2 feet below grade. Poorly graded sand was observed between 5 and 7 feet, between 10 and 12 feet, between 13 and 17 feet, and between 20 and 22 feet below grade. Elevated VOC levels were detected in the soil samples collected from this boring. The maximum reading was 180 ppm at 15 to 17 feet below grade.

Groundwater was encountered at 14 feet below grade. The screened section of the well was installed to 20 feet below grade.

B. Determination of Groundwater Flow Direction and Gradient

Water table elevation measurements were collected from all monitoring wells on April 30, 1999 using a Keck™ interface probe. These measurements were subtracted from the top of casing elevations, which were determined relative to an arbitrary datum of 100 feet at the top of the casing for MW-1, to determine the water table elevation at each of the wells. Groundwater level data are recorded in Appendix C. No free phase petroleum product was observed in any of the monitoring wells gauged on April 30, 1999.

As displayed in the groundwater contour map included in Appendix A, the groundwater flow direction on April 30, 1999 appears to flow radially outward from the vicinity of the UST system. The primary flow direction (that with the steepest gradient) appears to be to the southwest at a hydraulic gradient of approximately 4.2%. Under the groundwater flow regime described, MW-1 is located upgradient of the presumed source area. MW-2 is located cross gradient of the pump island. MW-3 is downgradient of the pump island and cross gradient from the former gasoline USTs. MW-4 is located downgradient of (1) former 4,000-gallon gasoline UST, and cross gradient of (2) former 4,000-gallon gasoline, the former diesel, and the former No. 2 fuel oil USTs.

C. Groundwater Sample Collection and Analysis

Groundwater samples were collected from each monitoring well immediately following well gauging on April 30, 1999. Samples were analyzed for the presence of VOCs per EPA Method 8021B, and for total petroleum hydrocarbons (TPH) via Method 8015 DRO (diesel range organics). Results of the laboratory analyses are summarized in Appendix D. Laboratory report forms are presented in Appendix E.

Concentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were detected in MW-2, MW-3, and MW-4 at levels above their respective Vermont Groundwater Enforcement Standards (VGESs). Concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX) were detected in MW-3 at levels above their respective VGESs. Toluene, ethylbenzene, and xylenes were also detected in MW-2 and MW-4 at levels below the VGESs.

TPH analysis detected diesel range organic compounds in the groundwater samples collected from MW-2, MW-3, and MW-4.

None of the compounds targeted by these analyses were detected in MW-1.

A contaminant plume appears to be concentrated in the vicinity of the MW-3, located to the west and northwest of the UST system, where subsurface petroleum contamination was originally detected in soils. The high xylene to benzene ratios in the groundwater samples collected from MW-2, MW-3, and MW-4 may be characteristic of an older, weathered petroleum release. MTBE was not detected in the samples collected from these wells, however, the sample specific method detection limit for MTBE exceeded the VGES in these wells.

The contaminant plume appears to be migrating more to the west than the predominant groundwater flow direction would indicate. This may indicate that groundwater flow beneath the site is more to the west than groundwater elevation measurements made on April 30, 1999 show, or that seasonal changes influence groundwater flow direction. This adjusted groundwater flow direction would place MW-3 downgradient of the source area, and MW-2 and MW-4 cross gradient of the source area.

All samples were collected according to Griffin's groundwater sampling protocol, which complies with industry and state standards. Results from the analyses of the trip blank and duplicate samples indicate that adequate quality assurance and control (QA/QC) were maintained during sample collection and analysis.

D. Soil Stockpile Monitoring

Approximately 60 cubic yards of petroleum contaminated soils were stockpiled on-site during UST closure activities. The stockpiled soils were screened for VOCs on April 30, 1999 using a HNu Model PI-101 PID equipped with a 10.2 eV bulb. Soils were screened using the Griffin Jar/Polyethylene Bag Headspace Screening Protocol, which conforms to state and industry standards.

Five samples were collected from depths between 2 and 3.5 feet within the stockpile. Screening results are presented below.

Soil Stockpile – VOC Screening Results

Sample ID	Depth (ft)	PID Reading (ppm)
SS1	2	0
SS2	3	48
SS3	2	18
SS4	3	65
SS5	3.5	37

E. Sensitive Receptor Risk Assessment

A receptor risk assessment was conducted to identify known and potential receptors of contamination detected at the Abrams Sunoco site. A visual survey was conducted during monitoring well installation. Based on these observations, a determination of the potential risk to identified receptors was made based on proximity to the expected source area (i.e., the former gasoline/diesel UST system), groundwater flow direction, and contaminant concentration levels in groundwater.

Water Supplies

Abrams Sunoco and the surrounding businesses and residences are served by the Champlain Water District which obtains its water from Lake Champlain. According to the Essex Junction Department of Public Works, there are no private drinking water supply wells in use in this area [2].

Buildings in the Vicinity

The on-site building does not have a basement for the potential accumulation of petroleum vapors. In addition, other buildings in the area are at minimal risk from the on-site gasoline contamination due to their distance from the source area.

Surface Water

The nearest surface waters are the Sunderland Brook, which is located approximately 1000 feet north of the subject site, and the Winooski River located approximately 3000 feet west of the subject site at its nearest point. The Winooski River is crossgradient of the source area, based upon the April 30, 1999 water table elevations. Based on contaminant concentrations measured on April 30, 1999, which indicate that contaminant migration may be primarily to the west, the Winooski River is downgradient of the source area, and Sunderland Brook is located cross gradient of the source area. Given the substantial distance of the river from the subject site, these surface waters are considered at minimal risk of petroleum impact.

IV. CONCLUSIONS

Based on the initial site investigation of petroleum contamination at the Abrams Sunoco site, the following conclusions are offered:

1. There has been an apparent release of gasoline and diesel fuel in the subsurface at the subject site.
2. Four shallow monitoring wells were installed at the site on April 21 and 22, 1999, to evaluate the degree and extent of subsurface petroleum contamination detected during the closure inspection of gasoline and diesel USTs in December 1998.
3. Low levels of adsorbed petroleum contamination (less than 8 ppm) were detected in soils collected from the boreholes for MW-1, MW-2, and MW-3.
4. Soils from the borehole for MW-4, located in the vicinity of the former gasoline UST system, had a maximum PID reading of 180 ppm.
5. Water table elevation data collected on April 30, 1999 indicate that groundwater in the overburden aquifer beneath the site flows radially outward from the vicinity of the UST system. The primary flow direction (that with the steepest gradient) appears to be to the southwest at a hydraulic gradient of approximately 4.2%.

6. The groundwater samples collected from MW-2, MW-3, and MW-4 were contaminated with petroleum related compounds. Concentrations of naphthalene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene were detected in each monitoring well at levels above their respective VGESs. Concentrations in MW-3 also exceeded the respective VGESs for BTEX compounds.
7. TPH analysis detected diesel range organic compounds in the groundwater samples collected from MW-2, MW-3, and MW-4.
8. The downgradient extent of the contaminant plume has not been defined with the current well array.
9. No free product was present in the on-site wells on April 30, 1999.
10. The high xylenes to benzene ratio in the groundwater samples collected from MW-2, MW-3, and MW-4 is characteristic of an older, weathered petroleum release. This finding would be consistent with a potential historic release from the gasoline/diesel UST system removed from the site in December 1998.
11. Approximately 60 cubic yards of petroleum contaminated soils are stockpiled on-site. VOC measurements made during the stockpile screening on April 30, 1999 ranged from 0 to 65 ppm. Based on these results, monitoring of the soil stockpile should be conducted on an annual basis, until VOC concentrations are nondetectable (less than 1 ppm) as measured with a PID, and there is no remaining visual or olfactory evidence of petroleum contamination. In the meantime, plastic covering the stockpile should be monitored on a regular basis by representatives of Abrams Sunoco.
12. Receptors in the vicinity of the site which has been identified as being at potential risk of impact from subsurface petroleum contamination is the Winooski River. Risk to the river is considered minimal at this time, given its distance from the contaminant source.
13. With the apparent source removed (i.e., the former gasoline, diesel, and No. 2 fuel oil USTs), it is expected that, over time, the natural processes of dilution, dispersion, and biodegradation will reduce dissolved contaminant concentrations present in groundwater beneath the Abrams Sunoco site.

V. RECOMMENDATION

Based upon the above conclusions, Griffin presents the following recommendations:

1. Because contaminant levels at the site were detected at concentrations greater than the VGES for several compounds, follow-up groundwater sampling should be conducted at this site. An appropriate future monitoring frequency will be recommended following review of data from the second round of groundwater sampling and analysis, which should be scheduled during the fall of 1999.
2. The stockpiled soils located on-site should be monitored on an annual basis until contaminant levels decrease to nondetectable levels (less than 1 ppm) and there is no remaining evidence (olfactory or visual) of petroleum contamination. At that time, in accordance with VTDEC guidelines (August 1996), the soils can be thin-spread on-site, with VTDEC approval.

need : - 3 down-gradient wells to define extent
- Contaminant plume map
- better area map
(see Former Cover Gas store, Kevin McGraw)
- include Abrams monitor wells and neighbors
around property to east, south, & west
- PDS of catch basins & utilities
- locate utilities
- soil pile monitoring plan w/ plastic covering
and fencing.

VI. REFERENCES

1. J.W. Sandri of VT, Inc., December 22, 1998. UST Closure Letter Report from Sharon Abbott to Vermont Department of Environmental Conservation re: Removal Report, Abrams Sunoco, UST Facility 102.
2. Telephone conversation between Griffin International and Essex Junction Department of Public Works, December 9, 1998.
3. Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, State of Vermont.
4. Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, State of Vermont.
5. USGS 7.5 Minute Topographic Quadrangle Map. 1948, photo-revised 1987. Burlington, Vermont.
6. USGS 7.5 Minute Topographic Quadrangle Map. 1948, photo-revised 1987. Colchester, Vermont.
7. USGS 7.5 Minute Topographic Quadrangle Map. 1948, photo-revised 1987. Essex Center, Vermont.
8. USGS 7.5 Minute Topographic Quadrangle Map. 1948, photo-revised 1987. Essex Junction, Vermont.

APPENDIX A

Maps

PROJECT 39941498 ABRAMS SUNOCO

LOCATION PEARL ST. ESSEX JCT.

DATE DRILLED 4/22/99 TOTAL DEPTH OF HOLE 22'

DIAMETER 4.25"

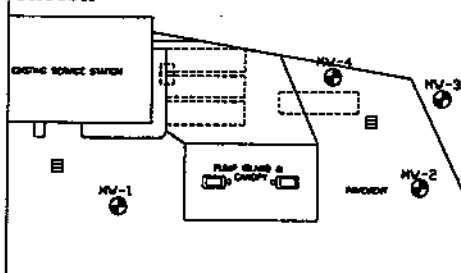
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 9'-6" TYPE sch 40 pvc

DRILLING CO. T&K DRILLING DRILLING METHOD HSA

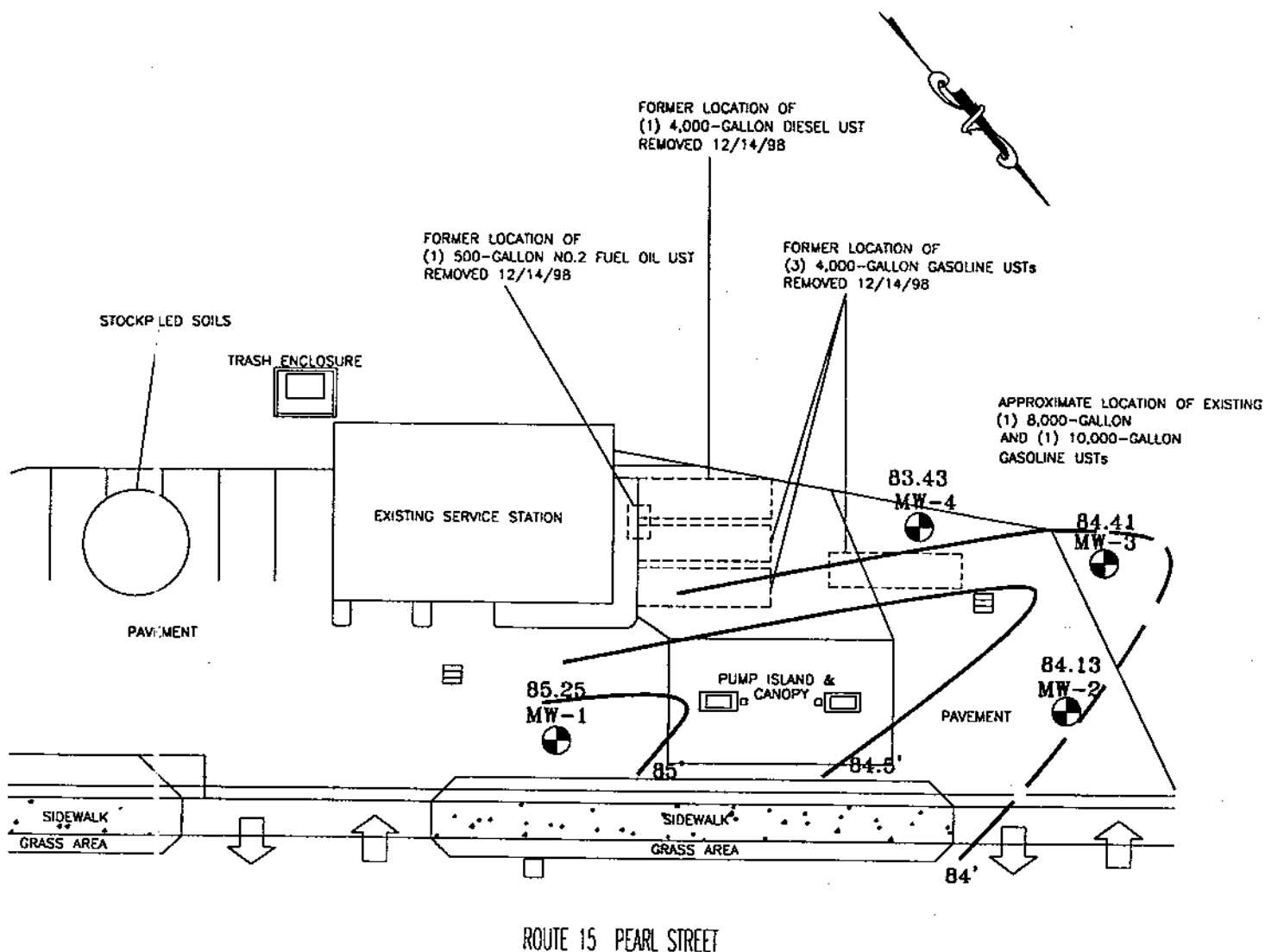
DRILLER ALAN TOMMILA LOG BY K McGRAW

WELL NUMBER MW4




Site
Sketch

GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE	1'-2' 280 ppm	Poorly Graded Sand (SP)- fine sand, dry, strong gasoline odor, brown	1
2		NATIVE BACKFILL			2
3		BENTONITE			3
4		NATIVE BACKFILL			4
5		WELL RISER	5'-7'- 2,1,1,1 160 ppm	Poorly Graded Sand (SP)- fine to medium sand, dry, gasoline odor, brown	5
6					6
7					7
8					8
9		BENTONITE			9
10					10
11		WELL SCREEN	10'-12'- 7,8,8,10 13.6 ppm	Poorly Graded Sand (SP)- fine sand, dry, petroleum odor, light brown	11
12					12
13			13'-15'- 8,10,12,10 78 ppm	Poorly Graded Sand (SP)- fine sand, petroleum odor, wet @ 14', olive brown	13
14				14.0' WATER TABLE	14
15					15
16		SILICA SAND	15'-17'- 6,10,10,11 180 ppm	Poorly Graded Sand (SP)- fine sand, strong petroleum odor, wet, olive brown	16
17					17
18					18
19		BOTTOM CAP			19
20					20
21			20'-22'- 1,3,6,6 3.4 ppm	Poorly Graded Sand (SP)- fine to medium sand, wet, no odor, brown	21
22					22
23				BASE OF WELL AT 20' END OF EXPLORATION AT 22'	23
24					24
25					25



LEGEND

-  MW 83.43' MONITORING WELL AND WATER TABLE ELEVATION IN FEET
 CATCH BASIN
 GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)

BASE MAP PROVIDED BY A.R. SANDRI, INC.
 SITE SURVEYED BY GRIFFIN INTERNATIONAL, INC. 4/22/99



JOB# 39941498

ABRAMS SUNOCO

142 PEARL ST., ESSEX JUNCTION, VT

GROUNDWATER CONTOUR MAP

MEASUREMENT DATE: APRIL 30, 1999

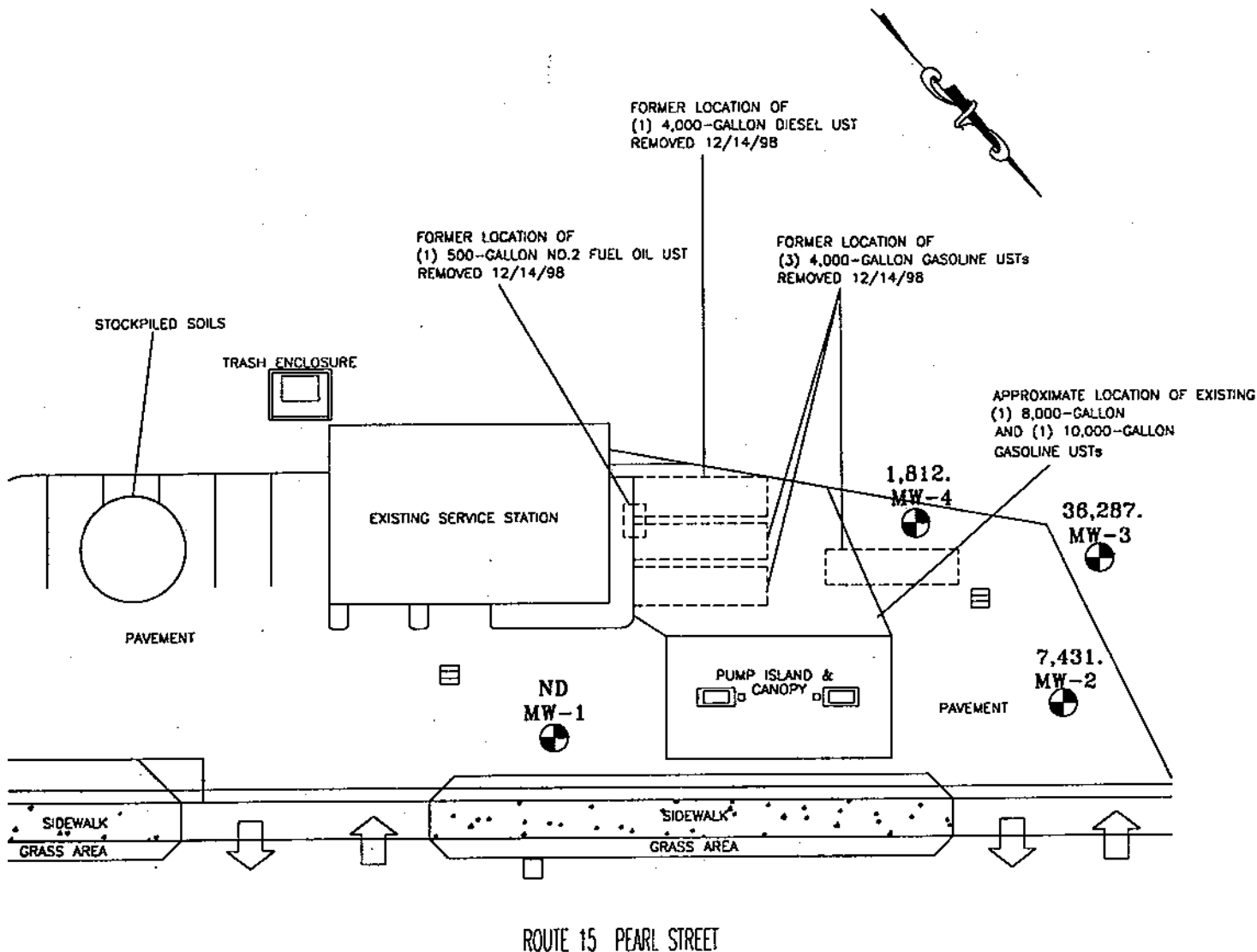
DATE: 7/9/99

DWG.#:1

SCALE: 1"=40'

DRN.:TG

APP.:BS



LEGEND

- MW4
 1,812
 MONITORING WELL AND TOTAL METHOD 8021B
 TARGETED VOC CONCENTRATION (ppb)
- CATCH BASIN
- ND
 NONE DETECTED

BASE MAP PROVIDED BY A.R. SANDRI, INC.
 SITE SURVEYED BY GRIFFIN INTERNATIONAL, INC. 4/22/99



JOB# 39941498

ABRAMS SUNOCO

142 PEARL ST., ESSEX JUNCTION, VT

CONTAMINANT CONCENTRATION MAP

SAMPLE DATE: 4/30/99

DATE: 7/9/99

DWG.#:1

SCALE: 1"=40'

DRN.:TG

APP.:BS

APPENDIX B

Well Logs

PROJECT 39941498 ABRAMS SUNOCO

LOCATION PEARL ST. ESSEX JCT.

DATE DRILLED 4/21/99 TOTAL DEPTH OF HOLE 22'

DIAMETER 4.25"

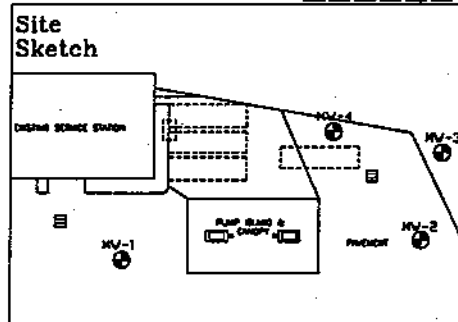
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 9'-6" TYPE sch 40 pvc

DRILLING CO. T&K DRILLING DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY K McGRAW

WELL NUMBER MW1



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE	1'-2' 0.4 ppm	Poorly Graded Sand (SP)- 90% fine sand, 10% fine gravel, dry, no odor, brown	1
2		NATIVE BACKFILL			2
3		BENTONITE			3
4		NATIVE BACKFILL			4
5		WELL RISER	5'-7'- 6,7,10,12 0.6 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, light brown	5
6					6
7					7
8		BENTONITE			8
9					9
10			10'-12'- 8,8,8,9 0.6 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, light brown	10
11		WELL SCREEN 0.10" SLOTTED SCREEN 2" DIAM. PVC			11
12					12
13					13
14				14.0' WATER TABLE	14
15		SILICA SAND	15'-17'- 4,7,9,8 0.4 ppm	Poorly Graded Sand (SP)- fine sand, wet, no odor, grayish brown	15
16					16
17					17
18					18
19		BOTTOM CAP			19
20			20'-22'- 1,4,6,7 0.6 ppm	Poorly Graded Sand (SP)- fine sand, wet, no odor, brown	20
21					21
22				BASE OF WELL AT 20' END OF EXPLORATION AT 22'	22
23					23
24					24
25					25

PROJECT 39941498 ABRAMS SUNOCO

LOCATION PEARL ST. ESSEX JCT.

DATE DRILLED 4/21/99 TOTAL DEPTH OF HOLE 22'

DIAMETER 4.25"

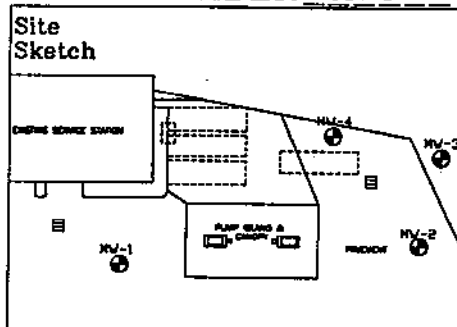
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 9'-6" TYPE sch 40 pvc

DRILLING CO. T&K DRILLING DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY K McGRAW

WELL NUMBER MW2



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE			1
2		NATIVE BACKFILL	1'-2' 0.4 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, brown	2
3		BENTONITE			3
4		NATIVE BACKFILL			4
5		WELL RISER	5'-7'- 2,2,4,5 0.3 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, rusty brown and brown	5
6					6
7					7
8		BENTONITE			8
9					9
10		WELL SCREEN	10'-12'- 4,6,8,11 0.4 ppm	Poorly Graded Sand (SP)-fine sand, dry, no odor, light brown	10
11					11
12			13'-15'- 6,9,9,10 0.4 ppm	Poorly Graded Sand (SP)-fine sand, wet @ 14', no odor, brown	12
13				14.0' WATER TABLE	13
14					14
15		SILICA SAND	15'-17'- 8,10,10,12 7.8 ppm	Poorly Graded Sand (SP)- fine sand, slight petroleum odor, wet, brown	15
16					16
17					17
18		BOTTOM CAP			18
19					19
20			20'-22'- 1,4,8,13 0.7 ppm	Poorly Graded Sand (SP)- fine sand, wet, no odor, brown	20
21					21
22				BASE OF WELL AT 20' END OF EXPLORATION AT 22'	22
23					23
24					24
25					25

PROJECT 39941498 ABRAMS SUNOCO

LOCATION PEARL ST. ESSEX JCT.

DATE DRILLED 4/22/99 TOTAL DEPTH OF HOLE 22'

DIAMETER 4.25"

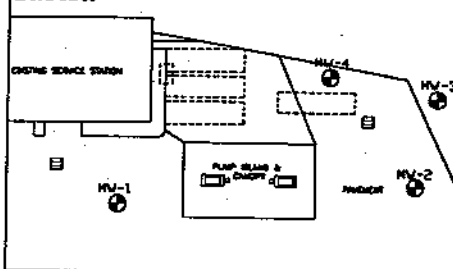
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 9'-6" TYPE sch 40 pvc

DRILLING CO. T&K DRILLING DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY K McGRAW

WELL NUMBER MW3

Site
Sketch

GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE			1
2		NATIVE BACKFILL	1'-2' 1.2 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, brown	2
3		BENTONITE			3
4		NATIVE BACKFILL			4
5		WELL RISER			5
6			5'-7'- 2,3,4,6 0.6 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, dark brown	6
7					7
8		BENTONITE			8
9					9
10					10
11		WELL SCREEN	10'-12'- 2,3,3,5 0.2 ppm	Poorly Graded Sand (SP)- fine sand, dry, no odor, rusty brown	11
12					12
13					13
14				14.0' WATER TABLE	14
15		SILICA SAND			15
16			15'-17'- 7,12,13,13 0.2 ppm	Poorly Graded Sand (SP)- fine sand, wet, no odor, olive brown	16
17					17
18					18
19		BOTTOM CAP			19
20					20
21			20'-22'- 2,4,4,5 0.6 ppm	Poorly Graded Sand (SP)- fine sand, wet, no odor, brown	21
22				BASE OF WELL AT 20' END OF EXPLORATION AT 22'	22
23					23
24					24
25					25

PROJECT 39941498 ABRAMS SUNOCO

LOCATION PEARL ST. ESSEX JCT.

DATE DRILLED 4/22/99 TOTAL DEPTH OF HOLE 22'

DIAMETER 4.25"

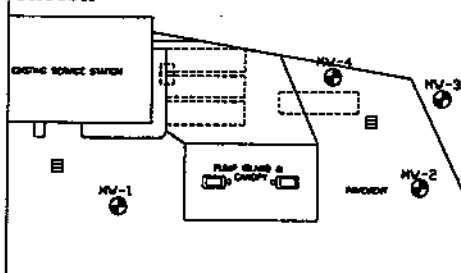
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 9'-6" TYPE sch 40 pvc

DRILLING CO. T&K DRILLING DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY K McGRAW

WELL NUMBER MW4

Site
Sketch

GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE	1'-2' 280 ppm	Poorly Graded Sand (SP)- fine sand, dry, strong gasoline odor, brown	1
2		NATIVE BACKFILL			2
3		BENTONITE			3
4		NATIVE BACKFILL			4
5		WELL RISER	5'-7'- 2,1,1,1 160 ppm	Poorly Graded Sand (SP)- fine to medium sand, dry, gasoline odor, brown	5
6					6
7					7
8		BENTONITE			8
9					9
10					10
11		WELL SCREEN	10'-12'- 7,8,8,10 13.6 ppm	Poorly Graded Sand (SP)- fine sand, dry, petroleum odor, light brown	11
12					12
13			13'-15'- 8,10,12,10 78 ppm	Poorly Graded Sand (SP)- fine sand, petroleum odor, wet @ 14', olive brown	13
14				14.0' WATER TABLE	14
15					15
16		SILICA SAND	15'-17'- 6,10,10,11 180 ppm	Poorly Graded Sand (SP)- fine sand, strong petroleum odor, wet, olive brown	16
17					17
18					18
19		BOTTOM CAP			19
20					20
21			20'-22'- 1,3,6,6 3.4 ppm	Poorly Graded Sand (SP)- fine to medium sand, wet, no odor, brown	21
22					22
23				BASE OF WELL AT 20' END OF EXPLORATION AT 22'	23
24					24
25					25

APPENDIX C
Liquid Level Monitoring Data

Abrams Sunoco
142 Pearl Street
Essex Junction, VT

Summary of Liquid Level Data
Measurement Date: April 30, 1999

Well I.D.	Well Depth btoc	Top of Casing Elevation	Depth To Product btoc	Depth To Water btoc	Product Thickness	Specific Gravity Of Product	Water Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW1	19.5	100.00	-	14.75	-	-	-	-	85.25
MW2	19.6	99.27	-	15.14	-	-	-	-	84.13
MW3	19.5	99.24	-	14.83	-	-	-	-	84.41
MW4	19.5	98.94	-	15.51	-	-	-	-	83.43

All Values Reported in Feet

btoc - Below Top of Casing

nm - not measured

Site surveyed by Griffin International, April 22, 1999 and Sandri, Inc.

Elevations determined relative to top of casing of MW1, which was arbitrarily set at 100'

APPENDIX D

Groundwater Quality Summary Data

Abrams Sunoco
142 Pearl Street
Essex Junction, VT

Groundwater Quality Summary
Sample Date: April 30, 1999

PARAMETER	MW1	MW2	MW3	MW4	VGES
Benzene	ND(1)	ND(50)	525.	ND(20)	5
Toluene	ND(1)	120.	14,200.	24.7	1,000
Ethylbenzene	ND(1)	629.	2,140.	53.2	700
Xylenes	ND(1)	5,070.	15,600.	1,210.	10,000
Total BTEX	ND	5,819.	32,465.	1,288.	-
1,3,5 Trimethyl Benzene	ND(1)	362.	837.	127.	4
1,2,4 Trimethyl Benzene	ND(1)	1,140.	2,680.	342.	5
Napthalene	ND(1)	110.	305.	54.8	20
MTBE	ND(10)	ND(500)	ND(2000)	ND(200)	40
Total Targeted VOCs	ND	7,431.	36,287.	1,812.	-
TPH (mg/L)	ND(0.40)	13.1	57.2	4.66	-

TBQ(): Trace below quantitation limit (quantitation limit)

ND(): Not detected (detection limit)

NT: Not tested

All values in ug/L (ppb) unless noted

Analysis by EPA Method 8021B, except for TPH by EPA Method 8015 DRO

VGES = Vermont Groundwater Enforcement Standards (Vermont Groundwater Protection Rule and Strategy, 11/15/97)

Abrams Sunoco
142 Pearl Street
Essex Junction, VT

Quality Assurance and Control Samples
Sample Date: April 30, 1999

PARAMETER	Trip Blank	Duplicate (MW-3)	VGES
Benzene	ND(1)	727.	5
Toluene	ND(1)	15,900.	1,000
Ethylbenzene	ND(1)	1,970.	700
Xylenes	ND(1)	16,500.	10,000
Total BTEX	ND	35,097.	
1,3,5 Trimethyl Benzene	ND(1)	821.	4
1,2,4 Trimethyl Benzene	ND(1)	2,670.	5
Napthalene	ND(1)	357.	20
MTBE	ND(10)	ND(2000)	40
Total Targeted VOCs	ND	38,945.	
TPH (mg/L)	ND(0.40)	62.4	-

Analysis by EPA Method 8021B, except for TPH by EPA Method 8015 DRO

All values in ug/L (ppb) unless noted

ND() = None detected (detection limit)

TBQ() = Trace below quantitation (detection limit)

VGES = Vermont Groundwater Enforcement Standards (Vermont Groundwater Protection Rule and Strategy, 11/15/97)

APPENDIX E

Laboratory Analysis Reports



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International

ORDER ID: 2202

PROJECT NAME: Abrams Sunoco/#39941498

REF.#: 137,846 - 137,851

REPORT DATE: May 12, 1999

DATE SAMPLED: April 30, 1999

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Griffin International

DATE RECEIVED: May 3, 1999

PROJECT NAME: Abrams Sunoco/#39941498

REPORT DATE: May 12, 1999

CLIENT PROJ. #: 39941498

ORDER ID: 2202

Ref. #:	137,846	137,847	137,848	137,849	137,850
Site:	MW1	MW2	MW3	Duplicate	MW4
Date Sampled:	4/30/99	4/30/99	4/30/99	4/30/99	4/30/99
Time Sampled:	10:55	11:25	12:14	12:14	11:50
Sampler:	WD	WD	WD	WD	WD
Date Analyzed:	5/11/99	5/12/99	5/12/99	5/12/99	5/12/99
UIP Count:	0	> 10	> 10	> 10	> 10
Dil. Factor (%):	100	2	0.5	0.5	5
Surr % Rec. (%):	99	97	97	102	100
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
MTBE	<10	<500	<2000	<2000	<200
Benzene	<1	<50	525.	727.	<20
Toluene	<1	120.	14,200.	15,900.	24.7
Ethylbenzene	<1	629.	2,140.	1,970.	53.2
Xylenes	<1	5,070.	15,600.	16,500.	1,210.
1,3,5 Trimethyl Benzene	<1	362.	837.	821.	127.
1,2,4 Trimethyl Benzene	<1	1,140.	2,680.	2,670.	342.
Naphthalene	<1	110.	305.	357.	54.8

Ref. #:	137,851				
Site:	Trip Blank				
Date Sampled:	4/30/99				
Time Sampled:	9:30				
Sampler:	WD				
Date Analyzed:	5/11/99				
UIP Count:	0				
Dil. Factor (%):	100				
Surr % Rec. (%):	100				
Parameter	Conc. (ug/L)				
MTBE	<10				
Benzene	<1				
Toluene	<1				
Ethylbenzene	<1				
Xylenes	<1				
1,3,5 Trimethyl Benzene	<1				
1,2,4 Trimethyl Benzene	<1				
Naphthalene	<1				

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY RECORD

Z (ref)

31774

Project Name: <u>ABRAMS SUNOCO</u>	Reporting Address: <u>GRIFFIN</u>	Billing Address: <u>same</u>
Site Location: <u>ESSEX JCT VT</u>		
Endyne Project Number: <u>2202</u>	Company: <u>GRIFFIN</u> <u>885 4200</u> Contact Name/Phone #: <u>BETH GIFFORD</u>	Sampler Name: <u>WILLIE DOE</u> Phone #: <u>SAME</u>

[illegible]

Relinquished by: Signature <i>William D-</i>	Received by: Signature <i>Stacy Benjamin</i>	Date/Time <i>4-5 5-1-97 1400</i>
Relinquished by: Signature <i>Stacy Benjamin</i>	Received by: Signature <i>[Signature]</i>	Date/Time <i>4-5 11:20</i>

New York State Project: Yes ☒ No ☒

Requested Analyses

[illegible]



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Griffin International

ORDER ID: 2202

PROJECT: Abrams Sunoco/#39941498

DATE RECEIVED: May 3, 1999

REPORT DATE: May 25, 1999

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

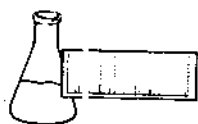
Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits, unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Griffin International
PROJECT: Abrams Sunoco/#39941498
REPORT DATE: May 25, 1999

ORDER ID: 2202
DATE RECEIVED: May 3, 1999
SAMPLER: WD
ANALYST: 820

Ref. Number: 137846 Site: MW1 Date Sampled: April 30, 1999 Time: 10:55 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	5/21/99

Ref. Number: 137847 Site: MW2 Date Sampled: April 30, 1999 Time: 11:25 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	13.1	mg/L	SW 8015B	5/23/99

Ref. Number: 137848 Site: MW3 Date Sampled: April 30, 1999 Time: 12:14 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	57.2	mg/L	SW 8015B	5/23/99

Ref. Number: 137849 Site: Duplicate Date Sampled: April 30, 1999 Time: 12:14 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	62.4	mg/L	SW 8015B	5/23/99

Ref. Number: 137850 Site: MW4 Date Sampled: April 30, 1999 Time: 11:50 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	4.66	mg/L	SW 8015B	5/21/99



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

Ref. Number: 137851

Site: Trip Blank

Date Sampled: April 30, 1999

Time: 9:30 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	5/21/99



32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY RECORD

Zorg

31774

Project Name: <i>#BRAMS SUNOCO</i>	Reporting Address: <i>GRIFFIN</i>	Billing Address: <i>Same</i>
Site Location: <i>ESSEX JCT VT</i>		
Endyne Project Number: <i>2202</i>	Company: <i>GRIFFIN</i> Contact Name/Phone #: <i>BETH STAFFORD 855-4388</i>	Sampler Name: <i>MILLIS DOE</i> Phone #: <i>Same</i>

[illegible]

Relinquished by: Signature <i>Willis D-</i>	Received by: Signature <i>Stacy Benjamin</i>	Date/Time <i>4-5-99 1400</i>
Relinquished by: Signature <i>Stacy Benjamin</i>	Received by: Signature <i>[Signature]</i>	Date/Time <i>5/3 11:20</i>

New York State Project: Yes ☐ No ☒

Requested Analyses

Requested Analyses											
1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										